



New generation cloud computing

We are pleased to present a special issue that focuses on the trends in the next generation of cloud computing. An obvious question that may arise in the mind of the reader is why another issue on clouds when there is plenty of discourse on the topic.

Undoubtedly, the cloud computing landscape is rapidly changing to meet the challenges of emerging paradigms, such as Fog/Edge computing and the Internet-of-Things (IoT). These paradigms rely on services offered by the cloud but are demanding—need to scale for billions of heterogeneous devices and sensors while operating efficiently in real-time.

In conventional cloud computing, all data is transmitted to data centers where it is processed and stored. The rate of expansion of data centers across the globe raises energy concerns and calls for innovative solutions to make data center computing sustainable. With billions of devices getting connected there is an urgent need for more pragmatic solutions that alleviate network congestion and reduces latencies that maintain and even improve the overall Quality-of-Service and Quality-of-Experience.

Some of the new trends seen in cloud computing over the last couple of years include computing at the edge of the network outside centralized data centers, redesigning/reconfiguring data centers for optimized execution of workloads, using heterogeneous processors, such as hardware accelerators in the cloud for faster application execution, and novel applications finding new generation clouds to satisfy their requirements.

This special issue, therefore, aims to focus the attention of its readers to nine research articles carefully selected after multiple rounds of peer-review to address some of the new and upcoming avenues of next-generation clouds. They include:

- Availability analysis of design configurations to compose virtual performance-optimized data centers systems in next-generation cloud data centers
- Toward scalable cloud data center simulation using high-level architecture
- IoTSim-Edge: A simulation framework for modeling the behavior of IoT and edge computing environments
- Deployment of a cloud pipeline for real-time visual inspection using fast streaming high-definition images
- Optimizing computational resource management for the scientific gateways ecosystems based on the service-oriented paradigm
- A multicriteria optimization model for cloud service provider selection in multicloud environments
- Partial migration technique for general purpose graphics processing unit tasks to prevent graphics processing unit (GPU) memory starvation in RPC-based GPU virtualization
- A systematic approach toward security in fog computing: Assets, vulnerabilities, possible countermeasures
- Analysis of a cloud migration framework for offline risk assessment of cloud service providers

These articles provide new definitions, architectures and approaches that have evolved from current clouds to accommodate the emerging computing paradigms and workloads. They address challenges across multiple dimensions of scalability, management, reliability, sustainability, heterogeneity and security.

We trust that you will find this special issue truly enjoyable and informative.

Blesson Varghese¹

Marco Netto²

Ignacio M. Llorente^{3,4}

Rajkumar Buyya⁵

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2020 The Authors. *Software: Practice and Experience* published by John Wiley & Sons, Ltd.

¹*School of Electronics, Electrical Engineering and Computer Science and The Institute of Electronics, Communications and Information Technology, Queen's University, Belfast, UK*

²*IBM, Sao Paulo, Brazil*

³*Institute for Applied Computational Science, Harvard School of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts*

⁴*Distributed Systems Architecture Research Group, Faculty of Informatics, Complutense University of Madrid, Madrid, Spain*

⁵*Cloud Computing and Distributed Systems (CLOUDS) Laboratory, School of Computing and Information Systems, University of Melbourne, Melbourne, Australia*

Correspondence

Blesson Varghese, School of Electronics, Electrical Engineering and Computer Science and The Institute of Electronics, Communications and Information Technology, Queen's University, Belfast, UK.

Email: b.varghese@qub.ac.uk

ORCID

Blesson Varghese  <https://orcid.org/0000-0001-8392-832X>